

Installation instructions, control box MultiLogic GOLD 04-120

1. General

MultiLogic is a software solution integrated with the SuperWISE system. MultiLogic's function is to control multiple GOLD air handling units as though they were one air handling unit.

SuperWISE is the communication unit in which all information, communication, control and calculations are gathered and displayed in a web interface or via an external communication protocol.

MultiLogic can either be activated as part of a Wise system or installed as a separate unit in another system.

SuperWISE is available in four basic variants, and MultiLogic can be selected for all of them during configuration.

2. Application area

MultiLogic is intended for DCV systems, where the air flow is controlled according to need in the building.

MultiLogic replaces the GOLD air handling unit's pressure control function. MultiLogic controls the air flow in all units to reach the pressure setpoint.

MultiLogic can also be controlled as a flow-regulated system. In this case, the desired flow setpoint is set in the interface.

If MultiLogic is pressure-controlled, a pressure sensor is connected to the respective air handling unit that MultiLogic is reading. In order to minimise energy consumption, the pressure sensor should be placed in the duct system in a location that allows the lowest possible pressure setpoint. For more information, see separate installation instructions for pressure sensors.

MultiLogic manages the start/stop sequence in accordance with rules preset by the user, distributing the total air flow between the available air handling units.

MultiLogic also manages pressure and temperature optimisation in WISE systems.

The web interface in SuperWISE helps users to use, maintain and optimise their MultiLogic unit.

The interface and its functions are described in the SuperWISE user manual.

The calendar function in SuperWISE can be used in MultiLogic.

The GOLD air handling units must be of the same type and be configured in the same way.

GOLD MultiLogic has been developed for GOLD RX, GOLD CX and GOLD RX/HC with IQlogic software version 2.40 or later.

In order to separate the air handling units, they must be supplied with dampers on all four duct connections.

Note: GOLD must not have an active schedule and must be set to "Normal stop" in Basic level operating mode under Time and schedule.



Each MultiLogic group can control four GOLD air handling units, and one SuperWISE can have up to twelve MultiLogic groups.

3. Installation

The software for MultiLogic is installed in the control unit prior to delivery when SuperWISE is configured for MultiLogic. For more details regarding the physical installation of e.g. the control box etc., see the separate installation instructions for SuperWISE.

4. Technical data

Material	Polycarbonate (PC)
Colour	RAL 7035 (Industrial grey)
Weight	6-8 kg
Dimensions	300 x 400 x 150/210 (WidthxHeightx-Depth)

CE marked. See the SuperWISE documentation for more information.

5. Electrical connection

Power supply 230 V, 10 A.

Connection from any port 3-8 on the contact in SuperWISE to port B on the control circuit board in the GOLD air handling unit.

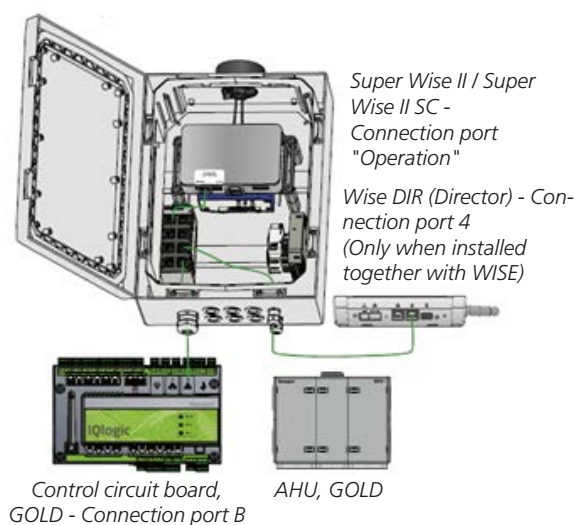
6. Commissioning

The commissioning of GOLD air handling units must be carried out in accordance with the relevant instructions.

The commissioning of SuperWISE must be carried out in accordance with the relevant instructions.

The IQlogic control unit in each GOLD air handling unit must have unique and fixed IP addresses.

Settings for MultiLogic are described in Section 7.



7. Description of functions

7.1 User interface

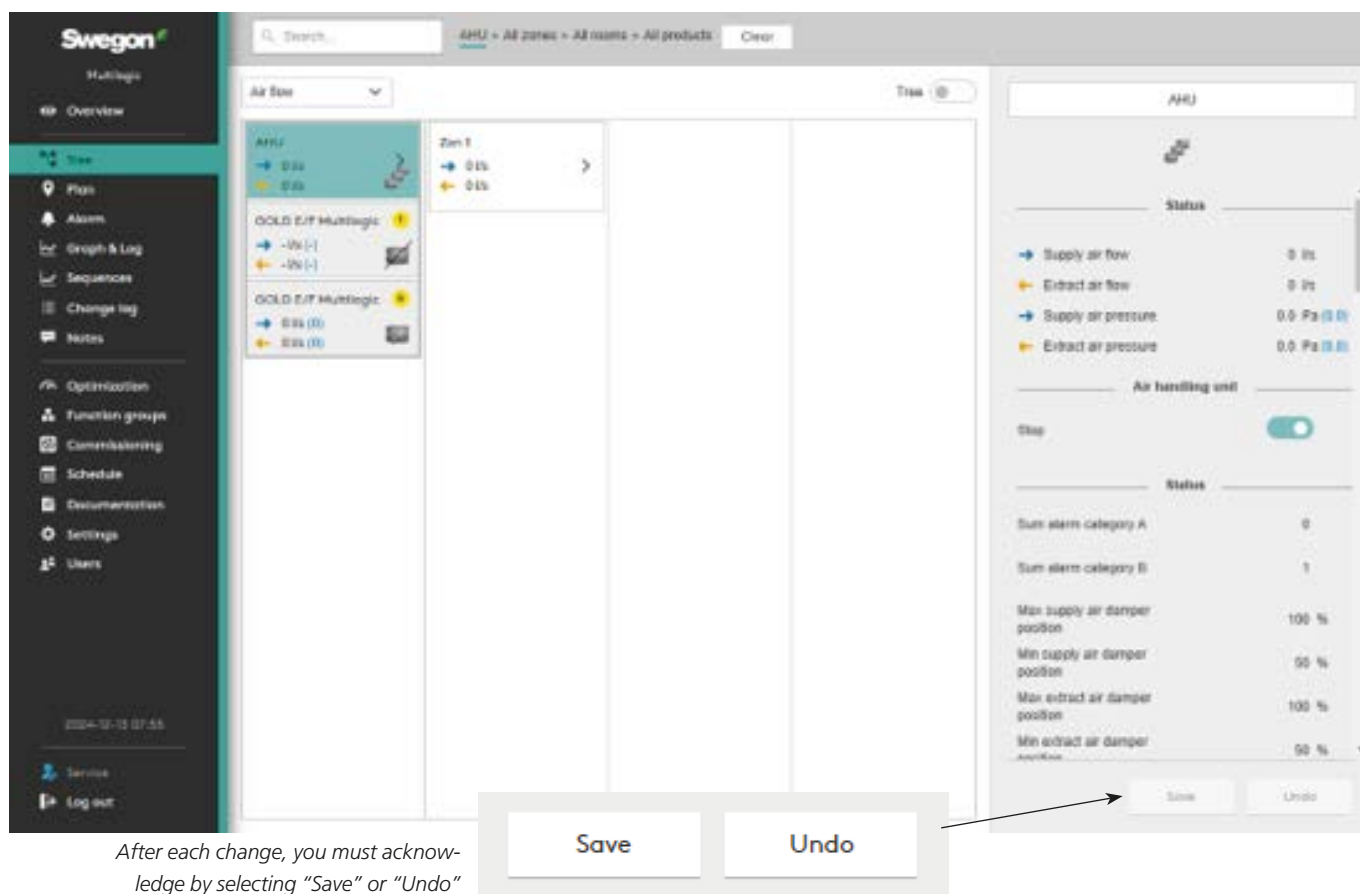
The user interface in the "tree menu" shows the various MultiLogic groups with their associated GOLD air handling units.

Air flow, pressure and temperatures can be read for each MultiLogic group. The air flow for a MultiLogic group is the sum of the air flows for the constituent GOLD air handling units.

For more information regarding the various functions in SuperWISE, please refer to the separate documentation for SuperWISE.



Clicking on a MultiLogic group opens the "tree menu" and displays connected air handling units. Operational status is indicated.



7.2 Reading

Shows the current flow and pressure as well as any activated function.

Status	
2 Operation mode	
→ Supply air flow	0 l/s
← Extract air flow	0 l/s
→ Supply air pressure	0.0 Pa (0.0)
← Extract air pressure	0.0 Pa (0.0)

7.3 Schedule

Any currently activated schedule is shown. To set the schedule, see 7.11.6.

Schedules	
AHU operation control 2	Normal stop
AHU summer night cool 1	Inactive

7.4 Operating mode

To start Multilogic, disable the stop button. The stop button has the highest priority.

You can select Manual operating mode when the stop button is disabled. If a schedule is enabled, it has the highest priority.

Low speed operation

High speed operation

Normal stop (Summer night cooling activated)

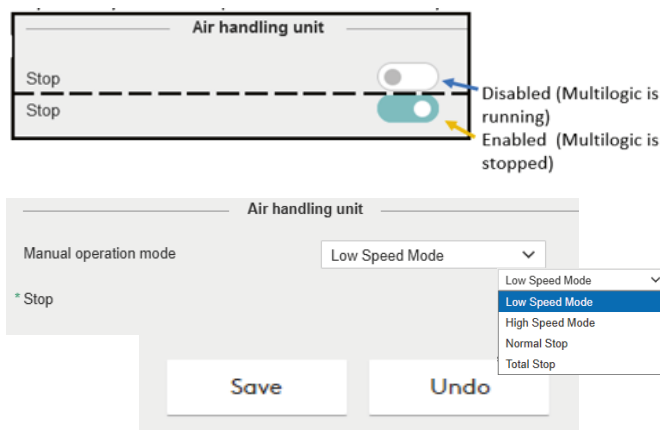
Total stop

Order of priority:

Stop button brings unit to a total stop (highest priority)

Activated schedule controls operating mode

Manual operation controls operating mode (lowest priority)



7.5 Status

Shows the combined status of the air handling units, group alarms A and B and Operating mode on MultiLogic, and min/max damper positions in the system for supply and extract air.

Status	
Sum alarm category A	0
Sum alarm category B	1
Max supply air damper position	100 %
Min supply air damper position	50 %
Max extract air damper position	100 %
Min extract air damper position	50 %
Operation mode	Communication total stop

7.6 Reading MultiLogic

Reading temperature, pressure and flows.
A temperature sensor can obtain its values from communication.
See chapter 7.5 for activation and description.

Status, Multilogic	
Supply air pressure	0.0 Pa
Supply air pressure setpoint	0.0 Pa
Supply air flow	0 l/s
Extract air pressure	0.0 Pa
Extract air pressure setpoint	0.0 Pa
Extract air flow	0 l/s
Outdoor air temp	20.7 °C
Supply air temperature	22.1 °C
Extract air temperature	21.9 °C

7.7 Temperature sensor

By activating Outdoor temperature sharing, the outdoor temperature (measured by a single sensor) will be forwarded to all air handling units.
Provided that the Room temperature for communication button is activated, it is possible to control the supply air temperature based on WISE room temperature sensors.

Function, Multilogic	
Out temperature distribution	☒
Room temperature for communication	☒

7.8 Optimisation (Only installed together with WISE)

The main purpose of the optimisation functions is to reduce energy consumption, but the functions also reduce the risks of experiencing problems with disturbing noise from the ventilation system.

Optimisation reduces/increases the fan speed by analysing the damper positions on the products that lie directly under the air handling unit. There is a configurable flag on each product that indicates whether the product should be included or excluded from the optimisation.

For more information, see Wise's documentation.

Optimization Multilogic	
* Optimization	☒
Alarm delay	10 min
Allowed deviation	10.0 Pa
Damper upper limit	90 %
Damper lower limit	70 %
Interval	5 min
Start delay time	10 min
Step	10.0 Pa
Max pressure supply air	400.0 Pa
Min pressure supply air	50.0 Pa
Start pressure supply air	50.0 Pa
Max pressure extract air	400.0 Pa
Min pressure extract air	50.0 Pa
Start pressure extract air	50.0 Pa
Pressure regulation timeout	- s

Optimization	
Next optimization update in	0 s
Optimization supply air max damper position	50 %
Supply air min damper position	50 %
Optimization extract air max damper position	50 %
Extract air min damper position	50 %
Supply air most open damper	-
Extract air most open damper	-

7.9 Regulation modes

The regulation mode can be selected individually for the supply air or the extract air respectively.

Air flow

Flow regulation involves operating MultiLogic to keep the preset air flow constant. MultiLogic calculates how many air handling units are needed to achieve the flow setpoint.

Duct pressure

The air flow automatically varies to provide constant pressure in the ducting. This regulation mode is therefore also called VAV Regulation (Variable Air Volume). Pressure regulation is used when e.g. damper operations increase the air volume in sections of the ventilation system. Depending on the setting, MultiLogic controls the GOLD air handling units to maintain the pressure in the supply air, the extract air or both.

MultiLogic uses these setpoints unless pressure optimisation in the WISE system is activated.

Slave

The flow is normally regulated constantly at the same value as the other flow direction (supply air or extract air) depending on which is selected as the master. If one flow direction is pressure-controlled, the other flow direction is controlled to the same flow.

Air handling unit	
Low speed supply air pressure setpoint	80.0 Pa
Low speed extract air pressure setpoint	80.0 Pa
High speed supply air pressure setpoint	100.0 Pa
High speed extract air pressure setpoint	100.0 Pa

Multilogic	
Supply air flow max	974 l/s
Supply air flow min	80 l/s
Extract air flow max	974 l/s
Extract air flow min	80 l/s
Controller P	0.1500
Controller I	0.0010
Start airflow hysteresis	10 %
Supply air regulation mode	Duct pressure ▼
Extract air regulation mode	Duct pressure ▼

7.10 MultiLogic settings

MultiLogic has been developed to minimise energy consumption, which it does by ensuring that fans run at the lowest possible speed to achieve the pressure setpoint.

MultiLogic will stop the air handling unit when the requested air flow falls below the combined minimum air flow in the active air handling units. The hysteresis prevents unwanted starting and stopping of the air handling units.

Controller P and Controller I

Controller P is the boosting of the output signal. A lower value provides "calmer" regulation.

Controller P governs how much impact the proportional part of the controller has. In other words, the part that is affected by how far the actual value is from the setpoint. If this is set to 0.01 and the current pressure is 40 Pa but should be 50 Pa, the P-part will contribute $(0.01 * (50-40)) = 0.1$, i.e. 10% of the maximum flow.

A low value for Controller I produces a slower and calmer transition to the desired setpoint. Higher values result in faster change, but also a greater risk of self-oscillation.

Start flow hysteresis

The start flow hysteresis exists as long as you do not have both supply air and extract air in flow regulation at the same time. In this case, the required air handling units are started immediately without any hysteresis or delay.

Hysteresis of the flow that is required before the next air handling unit is started. Higher values mean that a higher flow is required before the next air handling unit is started. It does not affect when the air handling unit is stopped. The flow that is required before the next air handling unit is started can be calculated using the formula:

current min. flow + start flow hysteresis x current min. flow + next air handling unit's min. flow.

Example: A MultiLogic with three air handling units that have a min. flow of 1000 l/s. The start flow hysteresis is set at 20%. Two of the air handling units are running. The combined min. flow will then be 2000 l/s. The flow that is required to start the next air handling unit can then be calculated with: $2000 + 2000 \times 0.2 + 1000 \rightarrow 3400$ l/s. This means that the third air handling unit will be started when MultiLogic requests a flow above 3400 l/s.

Multilogic	
Extract air flow setpoint	0 l/s
Supply air flow max	974 l/s
Supply air flow min	80 l/s
Extract air flow max	974 l/s
Extract air flow min	80 l/s
Controller P	0.1500
Controller I	0.0010
Start airflow hysteresis	10 %
Supply air regulation mode	Duct pressure ▼
* Extract air regulation mode	Slave ▼

7.11 Temperature regulation

The connected GOLD air handling units are controlled as supply air temperature control. MultiLogic can be set for various options, but the GOLD air handling units receive a setpoint for the supply air temperature from MultiLogic.

OFF

No temperature regulation active.

Temperature optimisation

The supply air temperature is controlled via WISE temperature optimisation.

Extract air/room

The supply air temperature is controlled by reading the temperature of the extract air or the rooms. Where the maximum and minimum supply air temperature can be set, as well as the source from where you obtain the temperature of the extract air or the rooms.

Supply air temperature

The air handling units are controlled by setting the setpoint for the supply air temperature.

7.11.1 Temperature optimisation

The supply air temperature is controlled via WISE temperature optimisation.

For optimisation, the setpoint value for the supply air can be calculated as a difference between supply air temperature and room temperature (Relative optimisation) or as a fixed upper and lower temperature limit (absolute optimisation). There is a fixed temperature setpoint value, which is used when there is no heating or cooling requirement in the group.

There are four different methods to calculate the common room temperature:

- Average value
- Lowest
- Highest
- Average value weighted

The difference between Average value and Average value weighted is that Average value weighted uses the room's maximum air flow as the weighting factor.

For more information, see Wise's documentation.

Supply air temperature control

* Temperature control mode: Off (selected)

Room temperature

Calculation mode

Supply air temperature control

* Temperature control mode: Temperature optimization

Room temperature: °C

Temperature load: %

Supply air temperature demand: °C

Heater limit mode: Absolute

Cooler limit mode: Absolute

Temperature at 0% demand: 19.0 °C

Temperature at 100% heating demand: 20.0 °C

Temperature at 100% cooling demand: 14.0 °C

Room temperature calculation mode: Average

Room temperature load calculation mode: Average

Heating boost supply air temperature: 26.0 °C

7.11.2 Extract air regulation summary

Shows combined status for the air handling units.

The temperature is obtained from the GOLD air handling units' room temperature sensors (highest priority), external duct temperature sensors or internal sensors (lowest priority).

The external duct temperature sensors must be mounted on the common extract air, see also separate installation instructions for Temperature sensor, extract air duct, TBLZ-1-76.

If the internal temperature sensor does not provide a sufficiently representative value, another source can be selected, either via Communication (BMS) or from System (WISE).

MultiLogic can be controlled in response to a computed mean value of the readings from the system's temperature sensors, alternatively in response to signals from the temperature sensor that measures the lowest or highest value.

Extract air/room temperature regulation is controlled by the aggregated regulation of extract air.

Extract air regulation summary	
Temperature priority	Extract air internal
Extract air regulation summary	21.8 °C
Temperature source	Air handling unit ▼
Temperature calculation mode	Average ▼

Air handling unit
Communication (BMS)
System (WISE)

Average
Min
Max

7.11.3 Outdoor regulation summary

Shows combined status for the air handling units.

The temperature can be obtained from the unit's external outdoor temperature sensor (highest priority) or the unit's internal outdoor temperature (lowest priority).

The outdoor air temperature can also be obtained from communication (BMS).

If the temperature is obtained from the GOLD AHU, it is possible to select the Max., Min. or Mean value from the connected AHUs.

Outdoor regulation summary	
Temperature priority	Outdoor air external
Outdoor regulation summary	20.7 °C
Temperature source	Air handling unit ▼
Temperature calculation mode	Average ▼

Air handling unit
Communication (BMS)

Average
Min
Max

7.11.4 Extract air/room temperature regulation

Extract air/room temperature regulation maintains a constant temperature in the exhaust duct(s) by regulating the supply air temperature.

The result will be a constant temperature in the premises regardless of load. Extract air regulation requires the installation of an air heater for post-heating, possibly an air cooler as well.

The setpoint for the exhaust air is set in the desired unit (°C or °F). The lowest and the highest permitted supply air temperatures are specified.

Extract air/room temperature regulation is controlled by the aggregated regulation of extract air.

See also the section on aggregated regulation of extract air.

Supply air temperature control	
* Temperature control mode	Extract air/room ▼
Supply air temperature demand	18.1 °C
Extract air/room setpoint	21.0 °C
Supply air temperature min	16.0 °C
Supply air temperature max	28.0 °C
Extract air regulation P-band	5.0 °K
Extract air regulation I-time	180 s

7.11.5 Supply air temperature control

Supply air regulation involves maintaining a constant supply air temperature without consideration to the load in the premises.

MultiLogic sets the same setpoint for all the connected air handling units.

Setpoint for the supply air is set in the required unit.

Supply air temperature control	
* Temperature control mode	Supply air ▼
Supply air temperature demand	- °C
Supply air temperature setpoint	21.0 °C

7.11.6 Summer night cooling

NOTE! Requires the GOLD units to have software version 2.46 or later.

The lower temperature at night is used to cool down the shell of the building. This reduces the cooling requirement during the first few hours of the day.

If the function is activated, the air handling unit operates at high speed with a supply air setpoint of 10°C (factory setting) from the preset time, until the conditions for stopping are met.

If the air handling unit is stopped for a period of time, test starts can be implemented to check if all the conditions, except the heating requirement, for summer night cooling are met. However, external temperature sensors for rooms are recommended. If the conditions are met, summer night cooling can be run.

The setpoint for supply and extract air flow or pressure can be set.

Aggregated regulation for extract air and outdoor air is used. See the section on aggregated regulation of extract air and outdoor air.

Conditions for start:

- The function is activated through the settings in the schedule.
- Heating requirement (V VX), has not existed for more than one hour between 12:00 and 23:59 (or SN function start time) and that the unit has been operating for at least 2 hours during the same time. If forced operation is selected, operation during these 2 hours is ignored.
- The outdoor temperature is above set value (10°C, factory setting).
- Extract air temperature is above set value for start (22°C, factory setting).
- The outdoor air is at least 2°C colder than the extract air.
- Multilogic does not operate at high speed.

Activation of summer night cooling

Summer night cooling is activated under schedule, where you also set the times when the unit can start the summer night cooling function.

When the times are set, select if operation should be forced or not. Forced means you don't take into account whether the unit has been operating for 2 hours between 12:00 – 23:59

7.12 Limitations

The air handling units must be the same size. Future versions are being planned where air handling units of different sizes can be used.

Mixing sections are not possible; this applies to both RX/HC with mixing section and ReCO₂.

Significant functions in IQlogic that are not supported by Multi-logic are COOL DX and Miruvent.

GOLD functions that change the setpoint for fan control should not be used, as they come into conflict with the MultiLogic controller, see below:

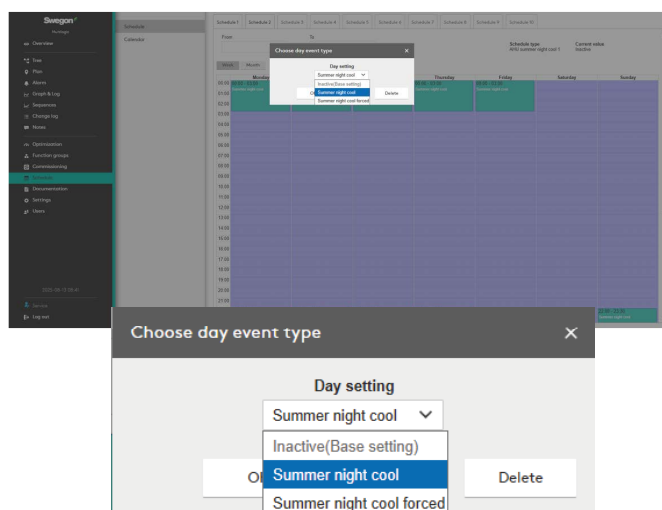
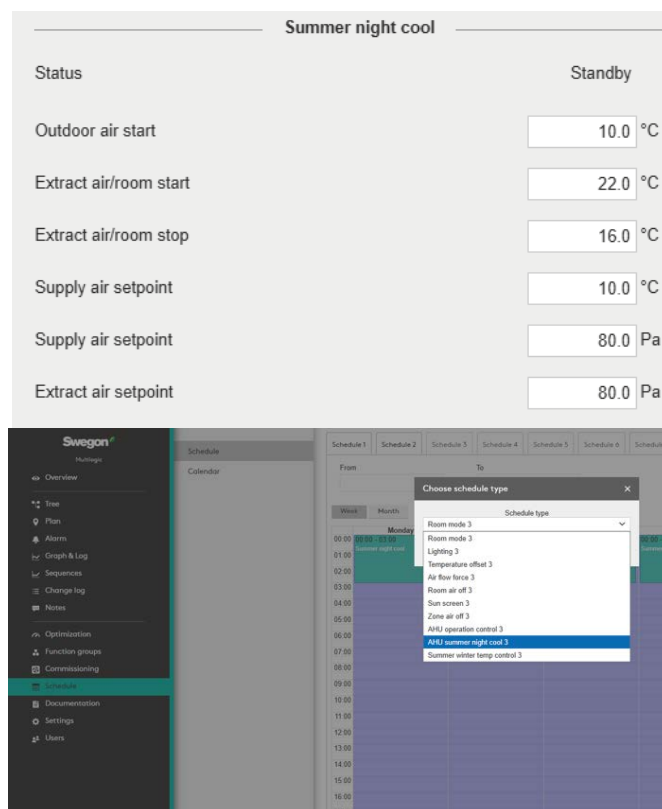
Setpoint displacement

Air adjustment

Outdoor air compensation

Booster diffusers

Down regulation (flow/pressure)

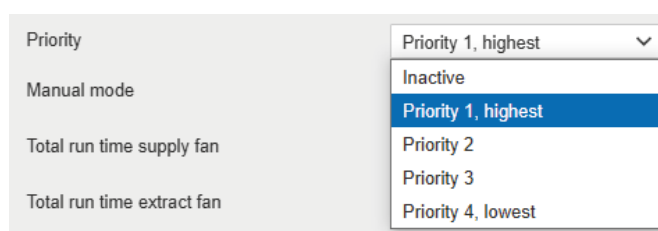


7.13 Operating priority, air handling unit

Setting takes place at the level of each air handling unit.

Here, it is possible to set the order in which the air handling units are to be started. The air handling unit with the highest priority is started first. When MultiLogic has to start another air handling unit, the next unit in order of priority is selected. MultiLogic ignores air handling units with the priority setting Inactive.

If multiple air handling units have the same order of priority, MultiLogic starts the air handling unit with the lowest number of operating hours when this setting is selected.



7.14 Flow stabilisation

When starting up from Total stop, MultiLogic has a stabilisation period during which WISE does not control the dampers. When MultiLogic has detected stable conditions for 30 seconds, a start signal is sent to WISE.

7.15 IQlogic stop button

The stop button on the GOLD air handling unit's IQnavigator hand-held terminal has priority over MultiLogic, which means that when the stop button is activated, the air handling unit is no longer available for use in MultiLogic. This also applies to the manual test function.

MultiLogic also ignores air handling units that are disconnected from the network/power supply or air handling units with ongoing critical alarms.

7.16 Defrosting heat exchanger

Defrosting is controlled by the relevant GOLD air handling unit where applicable.

7.17 Fire alarms

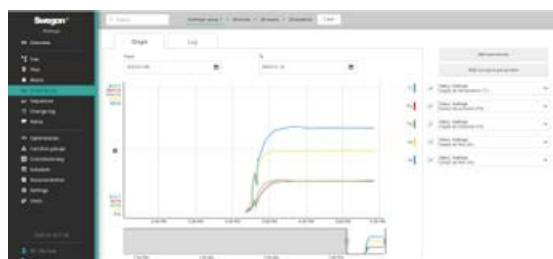
For fire alarms, all air handling units must be configured in the same way and be wired to an external fire alarm system. This means that all air handling units behave in the same way in the event of a fire. In the event of an internal fire alarm, MultiLogic will control that air handling unit to its preset fire alarm setting and stop all other units.

7.18 Graph and log function

The user interface in SuperWISE contains a graphical view of log data; it is also possible to download log data in csv format.

7.19 MultiLogic-specific alarms

Alarms are transferred from GOLD air handling units to SuperWISE and can be read in the Overview. In addition to alarms from GOLD air handling units and WISE systems, there are also a number of specific alarms for the MultiLogic system. See Section 7.17.



7.20 Occupancy (Only installed together with WISE)

Occupancy detection gives the opportunity to save energy at the same time as a good indoor climate is guaranteed.

For more information, see separate instructions for WISE.

Occupancy	
* Occupancy limit	1
Occupancy	0
Rooms	0
Rooms in occupancy	0
Rooms in occupancy	0 %

Communication mode is related to occupancy.

Occupancy is activated in communication mode.

Assumes that a schedule has been entered in order to steer towards this. Overrides No occupancy mode from schedule.

For more information, see separate instructions for WISE.

Communication operation mode	
* Control enabled	☒
On/Off delay	20 min

7.21 External heating/cooling signal (Only installed together with WISE)

External sources for heating and cooling can be integrated in the WISE system by signalling a general need for heating or cooling for the system.

For more information, see Wise's documentation

External heating/cooling signal	
Mode	Off
Sup	Off Highest/Lowest room temperature Number of rooms with heating/cooling demand Average room temperature
* Temperature control mode	

7.22 Blocking supply air, room (Only installed together with WISE)

Time from the moment when the room has detected that the increase in the supply air flow needs to be blocked (due to the temperature), until the point when blocking takes place.

Ensures that the reduction in the supply air flow takes place more slowly the nearer the supply air temperature gets to the desired temperature.

Room supply air block	
Delay, minutes	15 min
Delta	5 %

7.23 IT, security settings

In order for the communication between the GOLD unit and WISE to work, certain ports must be open in the firewall and allow traffic between the products.

For further information, see the separate document on security recommendations.

7.21 Alarm list, MultiLogic

Alarm list, MultiLogic	Category	Time delay	Description
Air handling unit suddenly disconnected.	A	Immediate	The air handling unit is randomly disconnected from MultiLogic due to network faults, for example. (This alarm will be initiated if the air handling unit is active or has started and suddenly been disconnected)
IP address not specified.	B	Immediate	The IP address is not specified for the air handling unit that is part of the configuration.
Manual mode is indicated.	I	Immediate	Manual mode is activated.
Critical GOLD alarm.	A	Immediate	This is a GOLD alarm, but it controls MultiLogic. A critical alarm initiated in the GOLD air handling unit removes the air handling unit from MultiLogic (e.g. a fire alarm).
TL pressure setpoint not reached. Check damper.	A	30 min.	The pressure setpoint is not reached even though all air handling units are running at maximum capacity. This may mean that dampers need new positions or that the setpoint should be reduced.
FL pressure setpoint not reached. Check damper.	A	30 min.	The pressure setpoint is not reached even though all air handling units are running at maximum capacity. This may mean that dampers need new positions or that the setpoint should be reduced.
TL pressure setpoint not reached. Activate more units.	A	20 min.	The pressure setpoint is not reached even though all connected air handling units are running at maximum capacity, but more air handling units are available. These air handling units can be in Manual mode or deactivated. The alarm notifies the user to activate the available air handling units in order to achieve the desired setpoint.
FL pressure setpoint not reached. Activate more units.	A	20 min.	The pressure setpoint is not reached even though all connected air handling units are running at maximum capacity, but more air handling units are available. These air handling units can be in Manual mode or deactivated. The alarm notifies the user to activate the available air handling units in order to achieve the desired setpoint.
TL pressure setpoint too low (may be due to another air handling unit running in manual operating mode/manual alarm stop or the pressure setpoint being negative)	B	10 min.	The pressure is negative, or there is a hurricane or some other unexpected scenario.
FL pressure setpoint too low (may be due to another air handling unit running in manual operating mode/manual alarm stop or the pressure setpoint being negative)	B	10 min.	The pressure is negative, or there is a hurricane or some other unexpected scenario.
TL duct module fault	A	Immediate	The duct pressure sensor is disconnected or faulty.
FL duct module fault	A	Immediate	The duct pressure sensor is disconnected or faulty.
Gold software version does not support multilogic summer night cooling	A	Immediate	Update the Gold software to 2.46 or later.